Configuring Data Compression Services

Router Software Version 10.0
Site Manager Software Version 4.0

Software Version BNX 6.0
Site Manager Software Version BNX 6.0

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Bay Networks

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About This Guide

If you are responsible for configuring and managing Bay Networks™ routers and/ or BNX™ switching platforms running over Frame Relay, Point-to-Point, or X.25 networks, read this guide to learn how to customize Bay Networks platforms for software- and hardware-based data compression.

Refer to this guide for

- An overview of data compression services (Chapter 1)
- Implementation notes that may affect how you configure compression services (Chapter 2)
- Instructions for using Site Manager to enable data compression (Chapter 3)
- Descriptions and instructions for editing compression line and interface parameters (Chapter 4)
- Default parameters settings (Appendix A)

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Routing and Switching software is available in the following suites.

- The *System Suite* includes IP routing, 802.1 Transparent Bridge, Source Route Bridge, Translation Bridge, SNMP Agent, Bay Networks HDLC, PPP, OSPF, EGP, BGP, and basic DLSw.
- The *LAN Suite* includes DECnet Phase 4, AppleTalk Phase 2, OSI, VINES, IPX, and ATM DXI, in addition to the System Suite.
- The *WAN Suite* includes ATM DXI, Frame Relay, LAPB, and X.25, in addition to the System Suite.
- The *Corporate Suite* includes the System, LAN, and WAN suites in their entirety.

- The *ARE ATM Suite* provides RFC 1483 and 1577 compliance, ATM UNI 3.0 signaling, in addition to the LAN Suite.
- The *ARE VNR Corporate Suite* provides ATM Forum LAN Emulation, in addition to the ARE ATM Suite and Corporate Suite.
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Availability of features and functionality described in this guide depends on the suites you are using.

Before You Begin

Before using this guide, you must complete the following procedures:

- Create and save a configuration file that has at least one Frame Relay, PPP, or X.25 interface.
- Retrieve the configuration file in local, remote, or dynamic mode.

Refer to *Configuring Routers* or *Configuring Customer Access (BNX Software)* for instructions.

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Bay Networks maintains a WWW Home Page that you can access at http://www.baynetworks.com. One of the menu items on the Home Page is the Customer Support Web Server, which offers technical documents, software agents, and an E-mail capability for communicating with our technical support engineers.

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Sydney, Australia	(61) 2-903-5800
Tokyo, Japan	(81) 3-328-005

Conventions

arrow character (➔)	Separates menu and option names in instructions. Example: Protocols➔AppleTalk identifies the AppleTalk option in the Protocols menu.
italic text	Indicates variable values in command syntax descriptions, new terms, file and directory names, and book titles.
quotation marks (“ ”)	Indicate the title of a chapter or section within a book.
`screen text`	Indicates data that appears on the screen. Example: `Set Bay Networks Trap Monitor Filters`
vertical line (|)	Indicates that you enter only one of the parts of the command. The vertical line separates choices. Do not type the vertical line when entering the command. Example: If the command syntax is **show at routes** | **nets**, you enter either **show at routes** or **show at nets**, but not both.

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Acronyms

CCP	Compression Control Protocol
CPC	Continuous Packet Compression
CRC	Cyclic Redundancy Check
DDN	Defense Data Network
ILI	intelligent link interface
LCP	Link Control Protocol
MIB	Management Information Base
NCP	Network Control Protocol
PDN	Public Data Network
PPC	Packet-by-Packet Compression
PPP	Point-to-Point Protocol
PTOP	Point-to-Point Protocol (proprietary to Bay Networks)
PVC	permanent virtual circuit
RFC	Request for Comment
VC	virtual circuit
WAN	wide area network
WCP	compression protocol (proprietary to Bay Networks)

Chapter 1
Data Compression Overview

Bay Networks data compression services enable you to reduce line costs and improve response times over wide area networks. Our data compression eliminates redundancies in data streams. When you use compression on your network, bandwidth efficiency improves, and you can transmit more data over a given amount of network bandwidth.

Our compression services include

- Software-based compression for Frame Relay, Point-to-Point Protocol (PPP), and X.25 networks for all router platforms and all serial interfaces. This includes PPP compression on multiline, multilink, on the ISDN BRI module, and on interfaces that use raise DTR or V.25 bis signaling with dial services.
- Hardware-based compression for Frame Relay and PPP networks that use the octal synchronous link module for the Backbone Node (BN®) using FRE2 processors. Bay Networks provides hardware compression as an optional daughterboard that attaches to the octal synchronous link module. Hardware compression supports all of the PPP services that software compression supports.

Bay Networks software- and hardware-based compression interoperate fully because they use the same algorithm.

To use data compression effectively, you must make decisions about how much memory to allocate to this task. The goal is to compress data as much as possible and to transmit the data as quickly as possible without unduly taxing the resources of the router.

Data Compression Architecture

Bay Networks uses the following algorithm and protocols to provide data compression services:

- LZ-77 algorithm
- Compression Control Protocol (draft RFC)
- Bay Networks proprietary compression protocol (WCP)

LZ-77 Algorithm

We base our data compression on a Lempel-Ziv (LZ-77) algorithm. The algorithm uses a sliding history buffer that stores the data that the network link has processed most recently. The compressor compares new data strings with data it has already processed and stored in the buffer. When the compressor detects data strings that match data it has already processed, it replaces those strings with offset and length tokens that are shorter than the original strings, thus compressing the data.

Compression Control Protocol (CCP)

Bay Networks uses the draft RFC Compression Control Protocol (CCP) only to enable or disable compression for PPP. CCP also includes a history reset request and acknowledgment capability, but our implementation of data compression does not use these features.

Bay Networks Compression (WCP)

Bay Networks data compression uses a proprietary transfer protocol (WCP) to enable compression for Frame Relay and for X.25, and to transport compressed packets for Frame Relay, X.25, and PPP. WCP negotiates compression mode, history size, and buffer size. For Frame Relay and PPP WCP also retransmits packets in the event of packet loss, and provides protection from inadvertent data expansion (LAPB retransmits packets for X.25).

Data Compression Performance

The goals in using data compression are to achieve a high *compression ratio* while maximizing *throughput.* Compression ratio is the size of uncompressed data compared to the size of the same data after it has been compressed. Throughput refers to the speed of transmitting data.

The compression ratio varies according to the effectiveness of the compression algorithm, but also according to the characteristics of the data you are transmitting: data that includes a lot of redundant strings compresses at a high ratio.

Throughput, or network response time, varies with the number of elements in that network that the data must traverse, including the compression/decompression process.

Software Compression

Bay Networks software-based data compression is most effective for sites that have WAN connections at relatively low speeds such as 56/64 KB, where you want to achieve data compression at low cost, and with minimal memory requirements. It supports up to 512 Kb/s on the FRE-040. For networks operating at faster speeds, you must use hardware compression.

Hardware Compression

Bay Networks hardware-based compression works with Frame Relay and Point-to-Point Protocol (PPP) networks. It best serves sites that support T-1/E-1 lines, which often concentrate many lower-speed remote connections. Our hardware compression facility operates at high speeds, and also supports high-density WAN connections. Use hardware compression when you want to achieve high compression ratios and throughput, and also want to preserve router memory to perform other functions.

We offer two compression daughterboards.

- AG2104037 — Octal Sync with a 32-context hardware compression daughterboard
- AG2104038 — Octal Sync with a 128-context hardware compression daughterboard

Hardware Compression Contexts

A *context* refers to compression and decompression for a single VC. Compression hardware maps a context to specific regions of compression and decompression memory. If you have a 32-context compression daughterboard, you can simultaneously run compression over 31 continuous packet compression (CPC) contexts, each using an 8 KB history size, with one shared 8 KB packet-by-packet (PPC) context. If you have a 128-context compression daughterboard, you can simultaneously run compression over 127 CPC contexts, each using an 8 KB history size, with one shared 8 KB PPC context. For more information on CPC and PPC, see the section, "Compression Mode," later in this chapter.

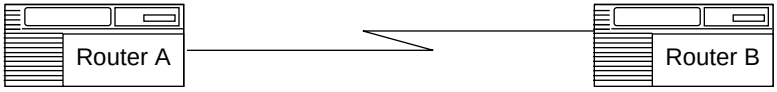
The only difference between the two Bay Networks compression daughterboards is that the 128-context daughterboard has more memory (2 MB compression/1 MB decompression, as opposed to 512 KB compression/ 256 KB decompression for the 32-context daughterboard).

Note: *If you configure more VCs for hardware compression than your daughterboard can support, you have no way of controlling which VCs will in fact use hardware compression. You should plan your network to use hardware compression on the VCs most important to you within the limits of your equipment. By default, all VCs that exceed the hardware context limit use software compression.*

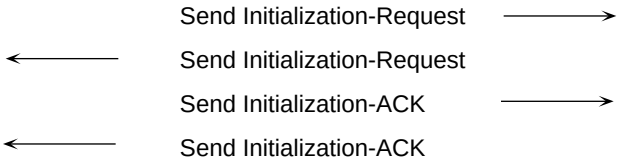
For more information, see the section, "History Size," later in this chapter.

How Data Compression Works

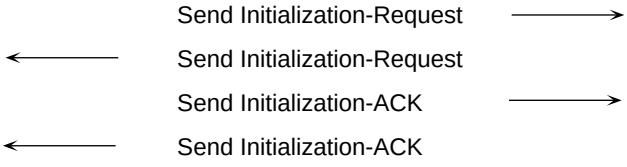
The following sections describe how Bay Networks data compression works. As you read these sections, refer to Figure 1-1, which illustrates CCP and WCP initialization on a PPP link.



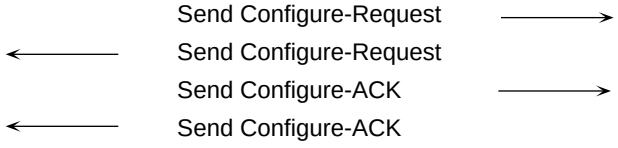
1. PPP interface on network; LCP negotiations complete; begin CCP negotiations:



2. CCP negotiations complete; begin WCP negotiations, including compression mode, history size, and buffer size:



3. WCP negotiations complete; begin NCP negotiations:



4. NCP open; begin transmitting data:

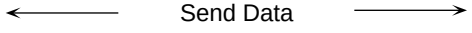


Figure 1-1. CCP, WCP, and NCP Initialization on a PPP Link

CCP Negotiations

CCP allows the two ends of a PPP connection to negotiate whether to use data compression, and if so, which algorithm to use. Our implementation of compression uses only the LZ-77 algorithm.

Note: *If one side of a link requests an algorithm that the other side does not support, traffic over the link continues, but in uncompressed form.*

In the example shown in Figure 1-1, negotiations begin when PPP establishes a link. CCP uses the same configuration and network control protocol negotiations that the Link Control Protocol (LCP) uses. For a detailed explanation of LCP negotiations, see “Establishing the PPP Link” in *Configuring PPP Services.*

WCP Negotiations

Frame Relay and X.25 use WCP to negotiate whether to use data compression, and which algorithm to use. As with PPP, if one side of a link requests an algorithm the other side does not support, traffic continues, but in uncompressed form.

Each side of a link running data compression has a compressor, a decompressor, a compression history, and a buffer. When you configure compression, you can edit WCP parameters for compression mode, history size, and buffer size to optimize compression performance on your network.

Data Transmission

Frame Relay and X.25 data transmission using compression begins when WCP negotiations are complete. For PPP, Network Control Protocol (NCP) negotiations and WCP negotiations occur simultaneously. When PPP NCP and WCP negotiations are complete, data transmission using compression begins.

Data Compression Parameters

The following sections describe data compression parameters, and give information about decisions you must make to use compression effectively on your network.

Compression Mode

You can compress data in one of two modes:

- Continuous Packet Compression (CPC) maintains compression history across packets. CPC yields a higher compression ratio than does Packet-by-Packet.
- Packet-by-Packet Compression (PPC) creates a new history for each packet. PPC yields a lower compression ratio than does CPC.

In most circumstances, you should select CPC to maximize compression.

Select PPC only for links that drop a very large number of packets. Be aware that under these circumstances, implementing data compression may offer marginal or no advantages.

If either side of the link specifies PPC, both sides of the link use PPC.

History Size

Each side of the link maintains both a *compression* and *decompression history* and a *lookup table*. The compression and decompression histories maintain a record of data that has already traveled across the network. The lookup tables maintain pointers to redundant strings and the offset and length tokens that replace each of those strings.

You can specify either 8 KB or 32 KB of local memory to maintain a compression history.

If the link uses software compression with a history of 8 KB, each end of the link allocates 8 KB of memory for compression, 16 KB for the compression lookup table, and 8 KB for decompression, or 32 KB. If the link uses a compression history of 32 KB, each end of the link allocates 32 KB of memory for compression, 64 KB for the compression lookup table, and 32 KB for decompression, for a total of 128 KB. Hardware compression entails similar requirements.

If you select different values for history size for the two sides of the link, the smaller of the two sizes becomes the history size for the link.

8 KB History Size

In general, 8 KB histories are appropriate for Frame Relay and X.25, when you have large numbers of VCs.

32 KB History Size

For PPP, with only one circuit per line, you may want to use a 32 KB history.

You may want to allocate a 32 KB history size for links with speeds higher than 64 Kb/s to improve throughput. The compressor can find a data pattern match up to three times faster using a 32 KB history than an 8 KB history.

History Size with Hardware Compression

Hardware compression daughterboards are available in 32 and 128 contexts. The numbers 32 and 128 assume a history size of 8 KB per context, although you can configure history size at either 8 KB or 32 KB. For example, if you configure history size at 32 KB, you have used four 8 KB contexts, and you have that many fewer contexts available to run hardware compression on your network.

Note: *Although software compression does not put strict limits on the number of contexts you can configure, be aware that memory requirements for history size are the same for software and hardware compression.*

Both boards reserve one 8 KB context for Packet-by-Packet, as opposed to Continuous Packet compression. There is no limit to the number of VCs that can use this one PPC context.

The compression hardware uses memory in units called *pages*, where a page equals 32 KB of memory. Each context that uses a 32 KB history uses one page of memory. Restrictions for CPC contexts using either 8 or 32 KB histories are that the memory used for any one history must be continuous, and it may not cross pages. For 8 KB contexts, these restrictions create few constraints, but for 32 KB contexts, they are significant.

Thirty-one CPC contexts each using an 8 KB history are possible on the 32 context board, and 127 contexts each using an 8 KB history are possible on the 128 context board. Table 1-1 indicates the maximum number of 8 KB contexts each board can support.

Table 1-1. Hardware Compression — 8 KB Contexts

	Max 8 KB CPC Contexts	Available 32 KB CPC Contexts	Reserved 8 KB PPC Context
32 Context Board	31	0	1
128 Context Board	127	0	1

On a 32 context board, the maximum number of 32 KB contexts is 7, and on a 128 context board, the maximum number of 32 KB contexts is 31, because of the 8 KB of memory the one PPC context requires. Table 1-2 summarizes this information.

Table 1-2. Hardware Compression — 32 KB Contexts

	Max 32 KB CPC Contexts	Available 8 KB CPC Contexts	Reserved 8 KB PPC Context
32 Context Board	7	3	1
128 Context Board	31	3	1

You can use a mix of 8 KB and 32 KB contexts on either board. Be aware that if you are bringing VCs up and down, memory fragmentation can occur. Even though you have 32 or more KB of compression memory available, if it is on different pages you will not be able to configure a 32 KB context. To solve this problem, you must save your configuration and reset the slot. When you reset the slot available compression memory is rearranged to be contiguous.

If you have memory available, you will always be able to add an 8 KB context, because 8 KB is the smallest divisible amount of compression memory.

Buffer Size

Buffer size is the amount of memory allocated to keep the transmission history. You must configure this parameter to protect against data loss if you run Frame Relay or PPP. You can select a buffer size of None, Normal, Large, or Very Large. The default value is Normal. Configure buffer space based on the following conditions:

- Length of time it takes for data to travel over the link

  A Normal buffer size usually suffices for a coast-to-coast connection within the United States. You may need a Large or Very Large buffer if your link is over a satellite connection.

- Number of dropped packets

  Increase the buffer size on a link with a large number of dropped packets. Decrease the buffer size, even to None, to conserve memory on a link with a very small number of dropped packets.

- Number of resets

  Increase the buffer size for a link with a large number of resets and a low number of dropped packets. Be aware, however, that a high number of resets may occur for reasons unrelated to buffer size.

Note: *X.25 is a reliable protocol, which means that it has features that check for errors and prevent data loss. Bay Networks data compression software therefore ignores the Buffer Size parameter for X.25, so if you are configuring compression for X.25, you do not need to set this parameter.*

Engine Type

The Engine Type parameter determines whether you use hardware or software compression. The default is software compression, unless you have selected an octal sync link module that has a hardware compression daughterboard, either AG2104037 or AG2104038, in which case the default is hardware. This parameter enables you to use software compression even though you are using one of these two octal sync link modules. You would select software compression for VCs in excess of the number of contexts your hardware compression daughterboard can support.

Fallback Compression Mode

This parameter is for hardware compression, and is configurable on a line basis only. Use it to indicate the compression mode you want to use when no hardware compression contexts are available. The options are software CPC and Hardware PPC.

Software CPC is a good choice for lower speed links, 64 Kb/s or less. It generally affords a better compression ratio than does Hardware PPC.

Hardware PPC is a good choice for higher speed links, greater than 64 Kb/s. It provides better throughput than does Software CPC.

Chapter 2
Implementation Notes

This chapter describes special features of Bay Networks data compression.

Bay Networks Data Compression Features

Our data compression works over wide area network links running Frame Relay, PPP, or X.25. It includes the following features:

- Compression for a FRE® module at 4 x 128 KB/s compressed throughput, full duplex; or 512 KB/s aggregate compressed throughput
- Compression on an AN® platform at 2 x 64 KB/s compressed throughput, full duplex; or 128 KB/s aggregate compressed throughput
- Compression on all intelligent link interface modules (ILIs) that support serial and ISDN BRI ports
- Software compression support for all Bay Networks platforms: AN, ASN®, and BN, plus VME
- Hardware compression support in an optional daughterboard for Frame Relay and PPP networks that use the octal synchronous link module for the BN, using FRE2 processors only.
- Compression configurable on a per-circuit or line basis
- Compression on MCT-1 and MCE-1 lines
- Compression on multiline and multilink

We do not support VJ header compression.

Compression Features for Specific Protocols

Bay Networks data compression services vary in some details according to the WAN protocols you configure. Read the following sections to learn about how our implementation of data compression applies to Frame Relay, PPP, and X.25 services.

Frame Relay Services

You can use software- or hardware-based data compression with Frame Relay interfaces that you configure to operate in group access, direct access, or hybrid access mode.

Group Access

When you enable data compression for Frame Relay in group access mode, every virtual circuit in the group uses compression. Each member of the group has its own compression history, however, so you may want to select a history size of 8 KB when you configure data compression in group mode.

Direct Access

When you use Frame Relay in direct access mode, you configure each permanent virtual circuit (PVC) individually, and each VC has its own compression history, so you may want to select a history size of 8 KB. You can use data compression with some PVCs and not with others.

Hybrid Access

Hybrid access mode combines group and direct access modes for use in nonmeshed networks that use both bridging and routing over a single Frame Relay interface. Hybrid access enables you to use PVCs in group mode for routing while simultaneously using the same PVCs for bridging.

When you enable data compression for Frame Relay on a hybrid circuit, both the bridged and the routed traffic over that circuit are compressed. Note that compression applies only to that PVC, and not to the other PVCs from the main circuit, unless you have also enabled compression in group mode for that interface. Conversely, if you enable data compression in group mode, but not on a PVC you have configured for hybrid mode, the hybrid circuit does not use compression.

PPP Services

You can use software or hardware data compression on all PPP circuits, including multiline and multilink, bandwidth-on-demand, dial-on-demand, and dial backup lines. When you use compression on a bandwidth-on-demand, dial-on-demand, or dial backup circuit, WCP automatically configures or deletes compression as lines are added to or removed from the circuit.

Multiline

Multiline is a feature that enables you to configure a single circuit that consists of one or more WAN data paths. A data path is a logical point-to-point channel; it can be a permanent or dial-up physical line, or it can be a virtual circuit connection. Multiline provides both increased fault tolerance and greater bandwidth between two sites.

For more information about Bay Networks multiline, see *Configuring Line Services* or *Configuring Customer Access (BNX Software).*

Multilink

The multilink feature of PPP provides capabilities beyond those of multiline circuits. Multilink consists of a *bundle* of lines between two peers, consisting of up to four links. Multilink has the ability to

- Distribute traffic across the lines in the bundle in amounts roughly proportional to the effective bandwidth of each link.
- Use lines that have different speeds, proportionally distributing traffic over those lines
- Balance traffic load and restore packet sequence
- Use switched lines (such as ISDN-B channels) as well as leased lines
- Monitor traffic volume

Bandwidth-on-Demand

Bandwidth-on-demand allows a secondary, dial-up line to augment a primary, leased line when the primary line experiences congestion. Congestion occurs when traffic volume exceeds line capacity. When congestion abates, the secondary line becomes inactive.

Dial-on-Demand

Dial-on-demand enables you to establish a circuit only when you want to transmit and receive data, as opposed to having a leased line, which is always available. By using a circuit on a demand basis, you can significantly reduce your line costs.

Dial Backup

PPP also allows you to configure a *dial backup* feature. If a primary PPP line fails and you have enabled dial backup, the router automatically establishes a backup line. You cannot enable any protocols, including compression, on a backup circuit, because a backup circuit inherits its protocols from the primary circuit. If the primary circuit uses compression, then the backup circuit does also.

For further information on Bay Networks dial services, see *Configuring Dial Services*.

X.25 Services

An X.25 network permits as many as 128 VCs to exist on the same physical link at the same time. You can configure each of those interfaces individually to use data compression or not.

X.25 PDN and DDN Services

When you use data compression on circuits that you configure for X.25 PDN or DDN services, you must be careful to enable compression on both sides of the link. If you configure compression on only one side of a PDN or DDN link, the data that travels over that link will be garbled.

You must also remember to enable the X.25 service record compression parameter for each X.25 interface you configure. See *Configuring X.25 Services* for more information about this parameter.

X.25 Max Window Size Parameter

Window size can affect packet throughput across the X.25 network. Setting the X.25 Max Window Size parameter too low can cause the router to drop packets and render data compression ineffective. You should configure this parameter at a higher value than the default setting.

Chapter 3
Enabling Data Compression Services

This chapter describes how to enable data compression services. It assumes you have read *Configuring Routers* and that you have

1. Opened a configuration file
2. Specified hardware if this is a local mode configuration file
3. Selected the link or net module connector on which you are enabling data compression
4. Selected Frame Relay, PPP, or X.25 from the WAN Protocols window

Note: *If you want to use hardware-based compression, you must select an Octal Sync Link Module that has a hardware compression daughterboard, either AG2104037 or AG2104038.*

When you enable data compression, you do not have to configure any data compression parameters. The Configuration Manager supplies default values for all data compression parameters. If you want to edit these default values, refer to Chapter 4.

Enabling Data Compression for PPP and Frame Relay

You enable data compression from the Select Protocols window (Figure 3-1) that appears after you select Frame Relay or PPP from the WAN Protocols window.

Enabling Data Compression for X.25

To enable data compression for X.25, select Protocols→Add/Delete from the X.25 Service Configuration Window after you have Added a Service record (see *Configuring X.25 Services*). The Select Protocols window appears.

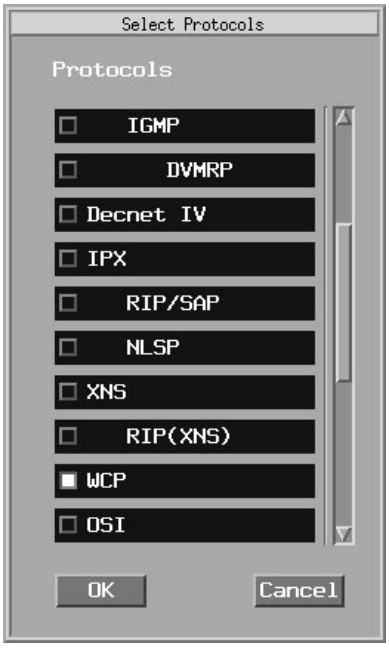


Figure 3-1. Select Protocols Window

1. **Scroll through the list to select WCP, (Bay Networks proprietary compression protocol). You may also select other protocols you want to configure.**
2. **Click on OK to implement data compression and any other protocols you want to configure, and to exit the window.**

Chapter 4
Editing Data Compression Parameters

This chapter provides information about customizing data compression parameters for the Frame Relay, X.25, or PPP interfaces you configure.

For each WCP parameter, this chapter gives the default setting, valid parameter options, the parameter function, instructions for setting the parameter, and the Management Information Base (MIB) object ID. With the exception of the Engine Type and Fallback Compression Mode parameters, these parameters apply to both software- and hardware-based compression. The Engine Type and Fallback Compression Mode parameters apply to hardware-based compression only.

The Technician Interface allows you to modify parameters by issuing **set** and **commit** commands with the MIB object ID. This process is equivalent to modifying parameters using Site Manager. For more information about using the Technician Interface to access the MIB, refer to *Using Technician Interface Software*.

Caution: *The Technician Interface does not verify that the value you enter for a parameter is valid. Entering an invalid value can corrupt your configuration.*

After you enable compression, you can edit all data compression parameters from the Configuration Manager window (Figure 4-1). Refer to *Configuring Routers or Configuring Customer Access (BNX Software)* for instructions on using Site Manager to access this window. Then read the section that follows for the protocol you are configuring.

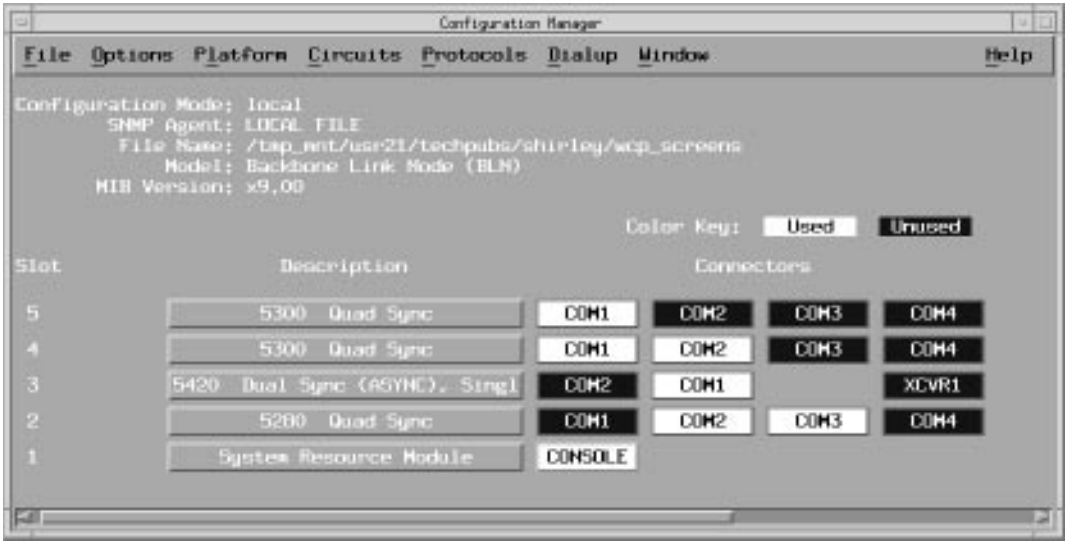


Figure 4-1. Configuration Manager Window

Configuring Data Compression for Frame Relay

You can use either hardware- or software-based data compression with Frame Relay.

Read the following sections to learn how to configure data compression for Frame Relay.

Group Access and Hybrid Access

When you configure Frame Relay in group access or hybrid access mode, you can run data compression on all members of the group or on none. Therefore, the easiest way to configure compression is to set values for the line parameters, and to accept the parameter default value, Inherit from Line, for the interfaces. Follow the instructions in the “Editing WCP Line Parameters” and “Editing WCP Circuit Interface Parameters” sections, later in this chapter.

Hybrid Access

If you configure Frame Relay in Group access mode and then add a PVC in Hybrid mode, the configuration file you create for the hybrid access PVC takes precedence over the Group configuration. Data compression will work only if you specifically configure it for the Hybrid PVC.

Direct Access

When you configure Frame Relay in direct access mode, you can configure circuits individually to run compression or not. To configure parameters for individual PVCs, follow the instructions in the "Editing WCP Circuit Interface Parameters" section, later in this chapter.

Configuring Data Compression for X.25

You can use software-based data compression with X.25.

X.25 allows many circuits per line. You may wish to use data compression on some circuits, but not on others. To configure compression for individual circuits, follow the instructions in the "Editing WCP Circuit Interface Parameters" section, later in this chapter.

When you use compression with X.25 PDN or DDN services, you must enable compression on both sides of the X.25 link for the circuit, line, and X.25 service record parameters, or your data will be garbled.

Configuring Data Compression for PPP

You can use software- or hardware-based data compression with PPP.

Since PPP allows only one circuit per line, you can configure most PPP WCP parameters by selecting either Protocols→WCP→Lines or Protocols→WCP→Interfaces. The only parameter that does not appear in both places is Buffer Size, which is a line parameter only.

Editing WCP Line Parameters

To edit WCP line parameters, begin at the Configuration Manager window (refer to Figure 4-1) and proceed as follows:

1. **Select Protocols→WCP→Lines.**

   The WCP Line Interfaces List window appears (Figure 4-2).

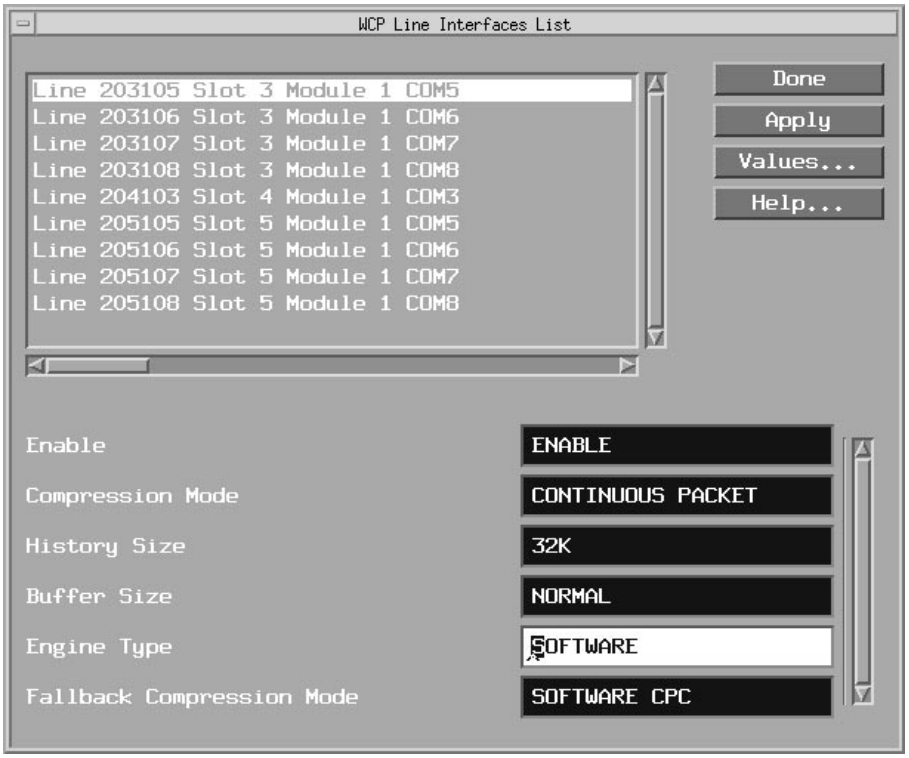


Figure 4-2. WCP Line Interfaces List Window

2. **Select a line from the list in the top left corner of the window.**

   The values in the parameter fields apply to the WCP line interface you highlight.

3. **Edit those parameters you want to change, using the descriptions following this list as a guide.**

4. **Click on Apply to implement your changes.**
5. **Repeat Steps 2 through 4 for each parameter you want to edit.**
6. **Click on Done to exit the window.**

WCP Line Parameter Descriptions

Use the following descriptions as guidelines when you configure the WCP line parameters.

Parameter:	**Enable**
Default:	Enable
Options:	Enable | Disable
Function:	Enables or disables data compression on the line.
Instructions:	WCP automatically sets this parameter to Enable when you select WCP in the Select Protocols window. If you want to temporarily disable WCP rather than delete it from the platform, set this parameter to Disable. Reset it to Enable to re-enable WCP.
MIB Object ID:	1.3.6.1.4.1.18.3.4.22.1.1.2

Parameter:	**Compression Mode**
Default:	Continuous Packet
Options:	Continuous Packet | Packet by Packet
Function:	Indicates the compression mode on the line. Continuous Packet Compression (CPC) retains compression history across packets and allows a higher compression ratio than does Packet-by-Packet Compression (PPC). PPC resets compression history at the start of each packet, resulting in a lower compression ratio. Since PPC does not depend on previous packets, you should select this option for a link that drops a large number of packets.
Instructions:	Select either Continuous Packet or Packet by Packet.
MIB Object ID:	1.3.6.1.4.1.18.3.4.22.1.1.5

Parameter:	**History Size**
Default:	32 K for software compression; 8 K for hardware compression
Options:	32 K | 8 K
Function:	Indicates the amount of memory allocated to compression history for the line. Remember that history size entails separate compression and decompression histories and lookup tables on each side of a link. For example, if the link uses software compression with a history of 8 KB, each end of the link allocates 8 KB of memory for compression, 16 KB for a compression lookup table, and 8 KB for decompression, or 32 KB total. If the link uses a compression history of 32 KB, each end of the link allocates 32 KB of memory for compression, 64 KB for a compression lookup table, and 32 KB for decompression, for a total of 128 KB. Hardware compression entails similar requirements. Selecting 32 K for PPP WCP should not pose a problem, because PPP allows only one circuit per line. Select 8 K or 32 K for Frame Relay and X.25 lines, depending on the resources of your network. Remember that if you are running Frame Relay in group mode, each interface in the group maintains its own history size. In general, 8 KB histories are appropriate for WAN links that run at 64 Kb/s or less, because less throughput is required. Use an 8 KB history size with Frame Relay and X.25, which have large numbers of VCs and low available bandwidth. You may want to allocate a 32 KB history size for links with speeds higher than 64 Kb/s to improve throughput. The compression engine can find a data pattern match up to three times faster using a 32 KB history than an 8 KB history. If you select different history sizes for the two sides of a link, the smaller of the two becomes the effective history size.
Instructions:	Select either 32 K or 8 K.
MIB Object ID:	1.3.6.1.4.1.18.3.4.22.1.1.6

Parameter:	**Buffer Size**
Default:	Normal
Options:	Very Large | Large | Normal | None
Function:	Indicates the amount of buffer memory for the transmission history on a line. Set this parameter according to the end-to-end round-trip length of a WCP connection.
Instructions:	Select Normal for most land-line, coast-to-coast connections. Select Large or Very Large for connections at a great distance from each other, such as satellite connections. Select None for links that drop a very small number of packets. Increase the buffer size for a link with a large number of resets.

Note: *Because X.25 has features that check for errors and prevent data loss, Bay Networks data compression software ignores the Buffer Size parameter for X.25. If you are configuring compression for X.25, you do not have to set this parameter.*

MIB Object ID: 1.3.6.1.4.1.18.3.4.22.1.1.7

Parameter:	**Engine Type**
Default:	Software, unless you have configured an Octal Sync Link module that has a hardware compression daughterboard, in which case the default is Hardware.
Options:	Software | Hardware
Function:	Determines whether compression for this node will be software- or hardware-based. You can use hardware compression with Frame Relay and PPP only. You can use software compression with Frame Relay, PPP, or X.25.
Instructions:	Select Software to use software-based compression or select Hardware to use hardware-based compression.

MIB Object ID: 1.3.6.1.4.1.18.3.4.22.1.1.8

Parameter:	**Fallback Compression Mode**
Default:	Software CPC
Options:	Software CPC | Hardware PPC
Function:	This parameter is for hardware compression only. Use it to indicate the compression mode you want to use when no hardware compression contexts are available. Software CPC is a good choice for lower speed links, 64 Kb/s or less. It generally affords a better compression ratio than does Hardware PPC. Hardware PPC is a good choice for higher speed links, greater than 64 Kb/s. It provides better throughput than does Software CPC. Refer to Chapter 1 for explanations of continuous packet and packet-by-packet compression modes.
Instructions:	Select Software CPC or Hardware PPC
MIB Object ID:	1.3.6.1.4.1.18.3.4.22.1.1.10

Editing WCP Circuit Interface Parameters

To edit WCP circuit interface parameters, begin at the Configuration Manager window (refer to Figure 4-1) and proceed as follows:

1. **Select Protocols→WCP→Interfaces.**

   The WCP Circuit Interfaces List window appears (Figure 4-3).

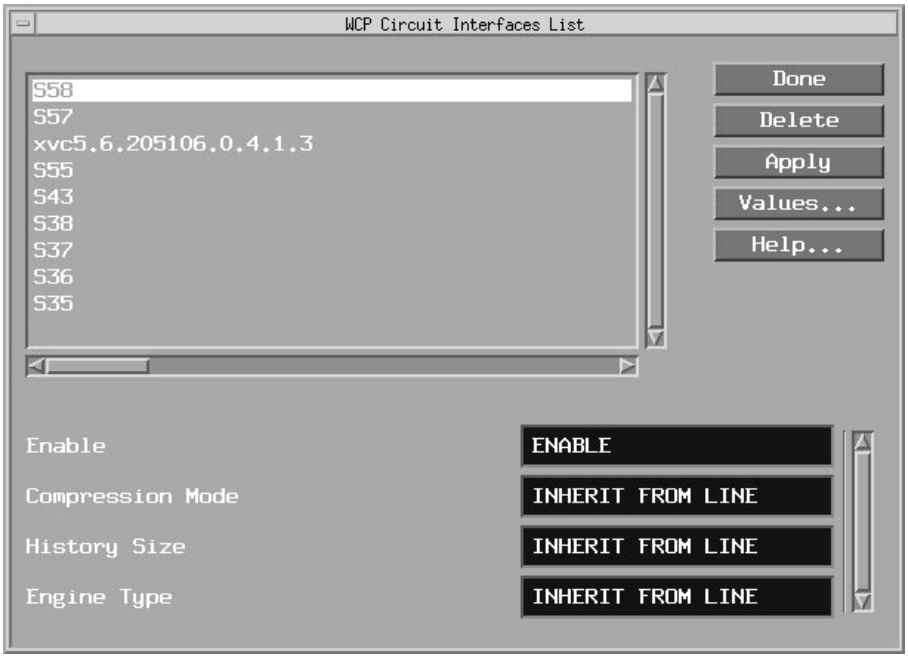


Figure 4-3. WCP Circuit Interfaces List Window

2. **Select the WCP circuit that you want to edit from the list in the top left corner of the window.**

   The values in the parameter fields apply to the WCP circuit interface you highlight.

3. **Edit those parameters you want to change, using the descriptions following this procedure as a guide.**

4. **Click on Apply to implement your changes.**

5. **Repeat Steps 2 through 4 for each parameter you want to edit.**

6. **Click on Done to exit the window.**

WCP Interface Parameter Descriptions

Use the following descriptions as guidelines when you configure the WCP interface parameters.

Parameter:	**Enable**
Default:	Enable
Options:	Enable | Disable
Function:	Enables or disables data compression on the circuit.
Instructions:	WCP automatically sets this parameter to Enable when you select WCP in the Select Protocols window. If you want to temporarily disable WCP rather than delete it from the platform, set this parameter to Disable. Reset it to Enable to re-enable WCP.
MIB Object ID:	1.3.6.1.4.1.18.3.4.22.2.1.2

Parameter:	**Compression Mode**
Default:	Inherit from Line
Options:	Continuous Packet | Packet by Packet | Inherit from Line
Function:	Indicates the compression mode on the circuit. Continuous Packet Compression (CPC) retains compression history across packets and allows a higher compression ratio than does Packet-by-Packet Compression (PPC). PPC resets compression history at the start of each packet, resulting in a lower compression ratio. Since PPC does not depend on previous packets, you should select this option for a link that drops a large number of packets. Inherit from Line allows you to set WCP parameters at the line level and apply them to circuits. For PPP, with only one circuit per line, this means that you can configure WCP at either the circuit level or the line level.
Instructions:	Select Inherit from Line if you want to accept the value in effect for the WCP Compression Mode line parameter. Otherwise, select either Continuous Packet or Packet by Packet.
MIB Object ID:	1.3.6.1.4.1.18.3.4.22.2.1.4

Parameter:	**History Size**
Default:	Inherit from Line
Options:	32 K | 8 K | Inherit from Line
Function:	Indicates the amount of memory allocated to compression history for the circuit. Remember that history size entails separate compression and decompression histories and lookup tables on each side of a link. For example, if the link uses software compression with a history of 8 KB, each end of the link allocates 8 KB of memory for compression, 16 KB for a compression lookup table, and 8 KB for decompression, or 32 KB total. If the link uses a compression history of 32 KB, each end of the link allocates 32 KB of memory for compression, 64 KB for a compression lookup table, and 32 KB for decompression, for a total of 128 KB. Hardware compression entails similar requirements. Selecting 32 K for PPP WCP should not pose a problem, because PPP allows only one circuit per line. Select 8 K or 32 K for Frame Relay and X.25 lines, depending on the resources of your network. Remember that if you are running Frame Relay in group mode, each interface in the entire group maintains a history size. In general, 8 KB histories are appropriate for WAN links that run at 64 Kb/s or less, because less throughput is required. Use an 8KB history size with Frame Relay and X.25, which have large numbers of VCs and low available bandwidth. You may want to allocate a 32 KB history size for links with speeds higher than 64 Kb/s to improve throughput. The compression engine can find a data pattern match up to three times faster using a 32 KB history than an 8 KB history. If you select different history sizes for the two sides of a link, the smaller of the two becomes the effective history size. Inherit from Line allows you to set WCP parameters at the line level and apply them to circuits.
Instructions:	Select Inherit from Line if you want to accept the value in effect for the WCP History Size line parameter. Otherwise, select either 32 K or 8 K.
MIB Object ID:	1.3.6.1.4.1.18.3.4.22.2.1.5

Parameter:	Engine Type
Default:	Inherit from Line
Options:	Software | Hardware | Inherit from Line
Function:	Determines whether compression for this node will be software- or hardware-based. You can use hardware compression with Frame Relay and PPP only. You can use software compression with Frame Relay, PPP, or X.25.
Instructions:	Select Inherit from Line if you want to accept the value in effect for the WCP Engine Type line parameter. Otherwise, select Software to use software-based compression or select Hardware to use Hardware-based compression.
MIB Object ID:	1.3.6.1.4.1.18.3.4.22.1.1.8

Deleting Data Compression from a Platform

To delete WCP from *all* circuits on which it is currently configured, complete the following steps:

1. **From the Configuration Manager window (refer to Figure 4-1), select Protocols→WCP→Delete WCP.**

   A window pops up and prompts

   ```
   Do you REALLY want to delete WCP?
   ```

2. **Click on OK.**

Site Manager returns you to the Configuration Manager window. WCP is no longer operating on the platform.

Appendix A
Parameter Default Settings

Tables A-1 and A-2 list WCP line and circuit interface parameters and their default values. See Chapter 4 for instructions on editing these parameters.

Table A-1. WCP Line Interface Parameters

Parameter	Default
Enable	Enable
Compression Mode	Continuous Packet
History Size	32 KB
Buffer Size	Normal
Engine Type	Software, unless you have configured an Octal Sync Link Module that has a hardware compression daughterboard, in which case the default is Hardware
Fallback Compression Mode	Software CPC (for hardware compression only)

Table A-2. WCP Circuit Interface Parameters

Parameter	Default
Enable	Enable
Compression Mode	Inherit from Line
History Size	Inherit from Line
Engine Type	Inherit from Line

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